

REC'D 19 DEC 2001

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference GS/P61102WO	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/03635	International filing date (day/month/year) 22/09/2000	Priority date (day/month/year) 24/09/1999
International Patent Classification (IPC) or national classification and IPC G01N21/77		
Applicant FARFIELD SENSORS LIMITED		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 7 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 12/04/2001	Date of completion of this report 17.12.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Mason, W Telephone No. +49 89 2399 2623 

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03635

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

### Description, pages:

1-26 as originally filed

### Claims, No.:

1-27 as originally filed

### Drawings, sheets:

1/17-17/17 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

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☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Yes: Claims 1-27
	No: Claims
Inventive step (IS)	Yes: Claims 7-10, 14-16, 20-23, 25-27
	No: Claims 1-6, 11-13, 17-19, 24
Industrial applicability (IA)	Yes: Claims 1-27
	No: Claims

2. Citations and explanations  
**see separate sheet**

## VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**RE: SECTION V - NOVELTY AND INVENTIVE STEP (ART. 33.2, 3 PCT)**

1. The present application relates to optical sensing devices comprising a planar optical component in particular comprising at least one optical waveguide whose temperature is carefully controlled - preferably thermoelectrically e.g. by means of Peltier elements in thermal contact with the sensing waveguide.

The following documents are referred to in this report:

D1=US5641230; D2=US5022045; D3=EP0851220

2. **PRIOR ART**

D1 (Figs. 1-5; cols 4-6) discloses a planar waveguide device for optical sensing (phase transitions in liquids - cloud point) wherein the sensor comprising the planar waveguide device and a Peltier assembly in intimate thermal contact therewith are housed in a cylinder 20 (Fig. 5). The top of the planar Peltier assembly 13 contacts with the waveguide substrate 5 and a thermocouple 18 is located at the interface - the bottom of the planar Peltier assembly contacts with a heat sink comprising a copper plate.

D2 ((Fig. 1; col 6, line 55 - col 7, line 25) cited against D1 discloses a cold mirror hygrometer for optical sensing (phase transitions in vapours - dew point).

D3 (Figs. 12A, B; cols 15-16) discloses a cloud point meter using a waveguide sensor 32 embedded in a thermal conductor 73 which contacts a Peltier element 74 and cooling jacket 75.

3. **NOVELTY (ART. 33.2 PCT)**

- 3.1 **INDEPENDENT CLAIM 1 (DEPENDENT CLAIMS 2-24)**

D1 summarised above is considered to represent the closest prior art and discloses all features of the device of claim 1 except :

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a) a cavity in the optical assembly.

Claim 1 and dependent claims 2-24 therefore meet the requirement of novelty

**3.2 INDEPENDENT CLAIMS 25, 26 (DEPENDENT CLAIM 27)**

These claims also meet the requirement of novelty in view of at least feature a).

**4. INVENTIVE STEP (ART. 33.3 PCT)**

**4.1 INDEPENDENT CLAIM 1**

D1 (Figs. 1, 4) discloses the device in a disassembled perspective from which the final spatial arrangement of substrate 5, Peltier 13 and heat sink plate 14 is not apparent. Since the Peltier element stands out above the plate it would appear that the lower surface of the substrate 5 would most obviously be recessed to receive it so as to avoid a gap between the lower surface of substrate 5 and the top surface of the plate not covered by the Peltier element. That the provision of such a cavity for accommodating Peltier elements would not require any inventive activity on behalf of the skilled person is also evident from e.g. D2 (Fig. 1) where Peltier element 8 is located in a cavity of an optical assembly.

Claim 1 therefore does not meet the requirement of inventive step.

**4.2 DEPENDENT CLAIMS 2-24**

**4.2.1** The features of the following dependent claims are disclosed in or evident from the prior art as indicated:

Claims 2-3, 5-6, 11-13, 24. D1

Claim 19. Urging means for Peltier exhaust onto Peltier assembly. In view of

the requirement of good thermal contact between the elements this feature is implicit from D1 / is disclosed in the form of a mass of glass 21 (Fig. 5).

Claims 17, 18. Outer temperature controller for coarse temperature control, outer Peltier. D1 (col 5, lines 50-60) refers to cascaded Peltier elements and D3 (Figs. 12A, 12B) illustrates the use of two stage cooling using an inner Peltier 74 and an outer cooling jacket 75.

Claim 4. Concave Peltier mount. Optimisation of the desired thermal conductivity between the Peltier element and the planar optical component by selection of such a concave shaped mount would be a matter of routine experimentation.

Claims 2-6, 11-13, 17-19, 24 therefore do not meet the requirement of inventive step.

4.2.2 The features of the following dependent claims are not evident from the cited prior art:

Claims 7, 8, 9, 10. Conducting sleeve, copper shroud, opening in sleeve for insertion of Peltier, heat shroud has integral laser module holder.

Claim 14. Conducting exhaust strip between Peltier and exhaust plate.

Claim 15, 16. Exhaust guide fits over insulating collar of laser module, exhaust guide defines a slot for exhaust strip.

Claims 20-21. Urging means for Peltier exhaust onto Peltier assembly in the form of restraining sleeve, with an aperture for to expose conducting sleeve to outer Peltier assembly.

Claim 22, 23. Conducting sleeve containing optical assembly, inner Peltier exhaust assembly thermally isolated from conducting sleeve, outer Peltier in thermal contact with conducting sleeve.

Claims 7-10, 14-16, 20-23 would therefore appear to meet the requirement of inventive step.

**4.3 INDEPENDENT CLAIMS 25-26 (DEPENDENT CLAIM 27)**

Independent claims 25-26 (and dependent claim 27) would appear to meet the requirement of inventive step for reasons presented above in respect of claims 7-10, 14-16, 20-23.

**RE: SECTION VIII - CLARITY (ART. 6 PCT)**

Independent claims 25, 26 should be reworded in respect of the planar optical component to make clear that this component is comprised in the optical assembly.



# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>GS/P61102W0</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 00/ 03635</b>	International filing date (day/month/year) <b>22/09/2000</b>	(Earliest) Priority Date (day/month/year) <b>24/09/1999</b>
Applicant  <b>FARFIELD SENSORS LIMITED</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

#### 1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

#### 4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

**DEVICE FOR TEMPERATURE CONTROLLED HOUSING OF A PLANAR OPTICAL COMPONENT**

#### 5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

#### 6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

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☐ None of the figures.



## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03635

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01N21/77 G01N25/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, INSPEC, COMPENDEX

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 641 230 A (OKUBO SHUICHI) 24 June 1997 (1997-06-24) column 4-6; figures 1-5 ----	1-27
A	US 5 022 045 A (ELLIOTT STANLEY B) 4 June 1991 (1991-06-04) column 6, line 55 -column 7, line 25; figure 1 ----	1-27
A	EP 0 851 220 A (JAPAN ENERGY CORP) 1 July 1998 (1998-07-01) column 15-16; figures 12A,,B ----- -/--	1-27



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*G\* document member of the same patent family

Date of the actual completion of the international search

17 January 2001

Date of mailing of the international search report

26/01/2001

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## INTERNATIONAL SEARCH REPORT

International Application No

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>LUKOSZ W ET AL: "Difference interferometer with new phase-measurement method as integrated-optical refractometer, humidity sensor and biosensor"</p> <p>SENSORS AND ACTUATORS B,CH,ELSEVIER SEQUOIA S.A., LAUSANNE, vol. 39, no. 1-3, 1 March 1997 (1997-03-01), pages 316-323, XP004087764 ISSN: 0925-4005 page 320; figure 1</p> <p>---</p>	1-27
A	<p>LUKOSZ W: "Integrated optical chemical and direct biochemical sensors"</p> <p>SENSORS AND ACTUATORS B,CH,ELSEVIER SEQUOIA S.A., LAUSANNE, vol. 29, no. 1, 1 October 1995 (1995-10-01), pages 37-50, XP004000850 ISSN: 0925-4005 page 47; figure 9</p> <p>---</p>	1-27
A	<p>STAMM C ET AL: "Biosensing with the integrated-optical difference interferometer: dual-wavelength operation"</p> <p>OPTICS COMMUNICATIONS,NL,NORTH-HOLLAND PUBLISHING CO. AMSTERDAM, vol. 153, no. 4-6, 1 August 1998 (1998-08-01), pages 347-359, XP004146376 ISSN: 0030-4018 page 355-357; figure 1</p> <p>---</p>	1-27
A	<p>PATENT ABSTRACTS OF JAPAN vol. 016, no. 402 (P-1409), 25 August 1992 (1992-08-25) &amp; JP 04 134326 A (MATSUSHITA ELECTRIC IND CO LTD), 8 May 1992 (1992-05-08) abstract</p> <p>---</p>	1-27
A	<p>US 4 744 661 A (ULBERS GERD ET AL) 17 May 1988 (1988-05-17) column 4-6; figures 2,3</p> <p>---</p>	
A	<p>PATENT ABSTRACTS OF JAPAN vol. 016, no. 357 (P-1395), 31 July 1992 (1992-07-31) &amp; JP 04 110804 A (NEC CORP), 13 April 1992 (1992-04-13) abstract</p> <p>-----</p>	1-27

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5641230	A	24-06-1997	WO	9424544 A	27-10-1994
US 5022045	A	04-06-1991	CA	1282250 A	02-04-1991
			EP	0231355 A	12-08-1987
			WO	8700925 A	12-02-1987
EP 0851220	A	01-07-1998	KR	247355 B	01-04-2000
			US	6076959 A	20-06-2000
			WO	9801748 A	15-01-1998
JP 04134326	A	08-05-1992	NONE		
US 4744661	A	17-05-1988	DE	3630887 A	08-10-1987
			EP	0242407 A	28-10-1987
			EP	0242436 A	28-10-1987
			JP	62232502 A	13-10-1987
			JP	1840435 C	25-04-1994
			JP	62232503 A	13-10-1987
			JP	5045161 B	08-07-1993
			US	4717255 A	05-01-1988
JP 04110804	A	13-04-1992	JP	2586708 B	05-03-1997